

# Climate Change and Older Americans

## Climate Change and the Health and Well-Being of Older Americans: Setting a Research Agenda

US EPA / July, 2011



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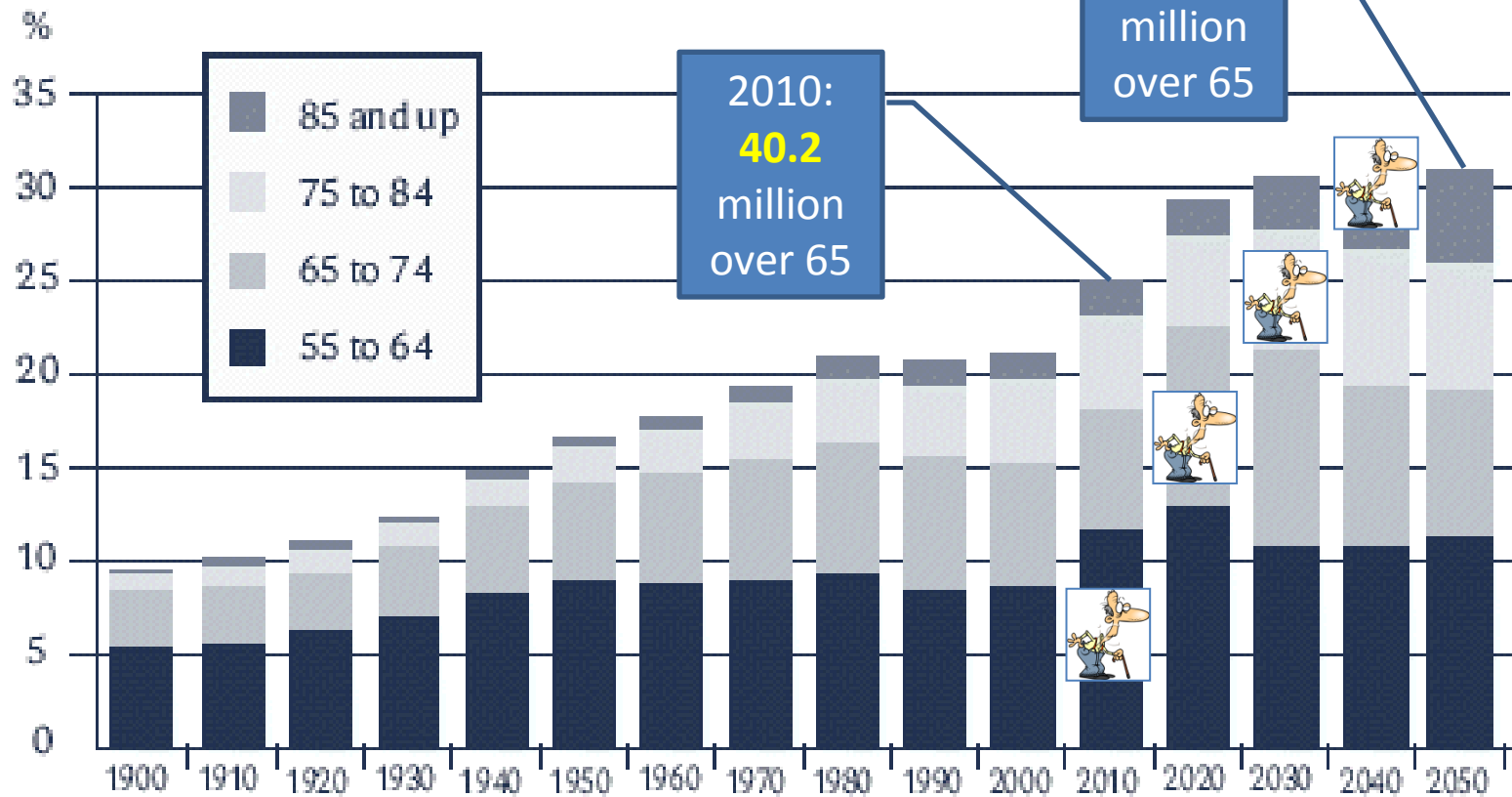
# Agenda

- Demographics
- Vulnerabilities
- Co-benefits
- Opportunities
- The research agenda



# Demographics: Aging

**Figure 3:** The Graying of the United States



Sources: 1900-1980: U.S. Bureau of the Census, Decennial Censuses of Population. 1990: U.S. Bureau of Census, Projections of the Population of the United States, by Age, Sex, and Race: 1983 to 2080. Current Population Reports, Series P-25, No. 952, May 1994. Projections are Middle Series, 2000-2050; U.S. Census Bureau, Projection Groups, and Sex with Special Age Categories, Middle Series, 1999 to 2100, (NP-T3), January 2000. All from [www.ntftd.com](http://www.ntftd.com).

# Demographics: Diversity

Figure 1.1: Changing American Demographics 1970-2050

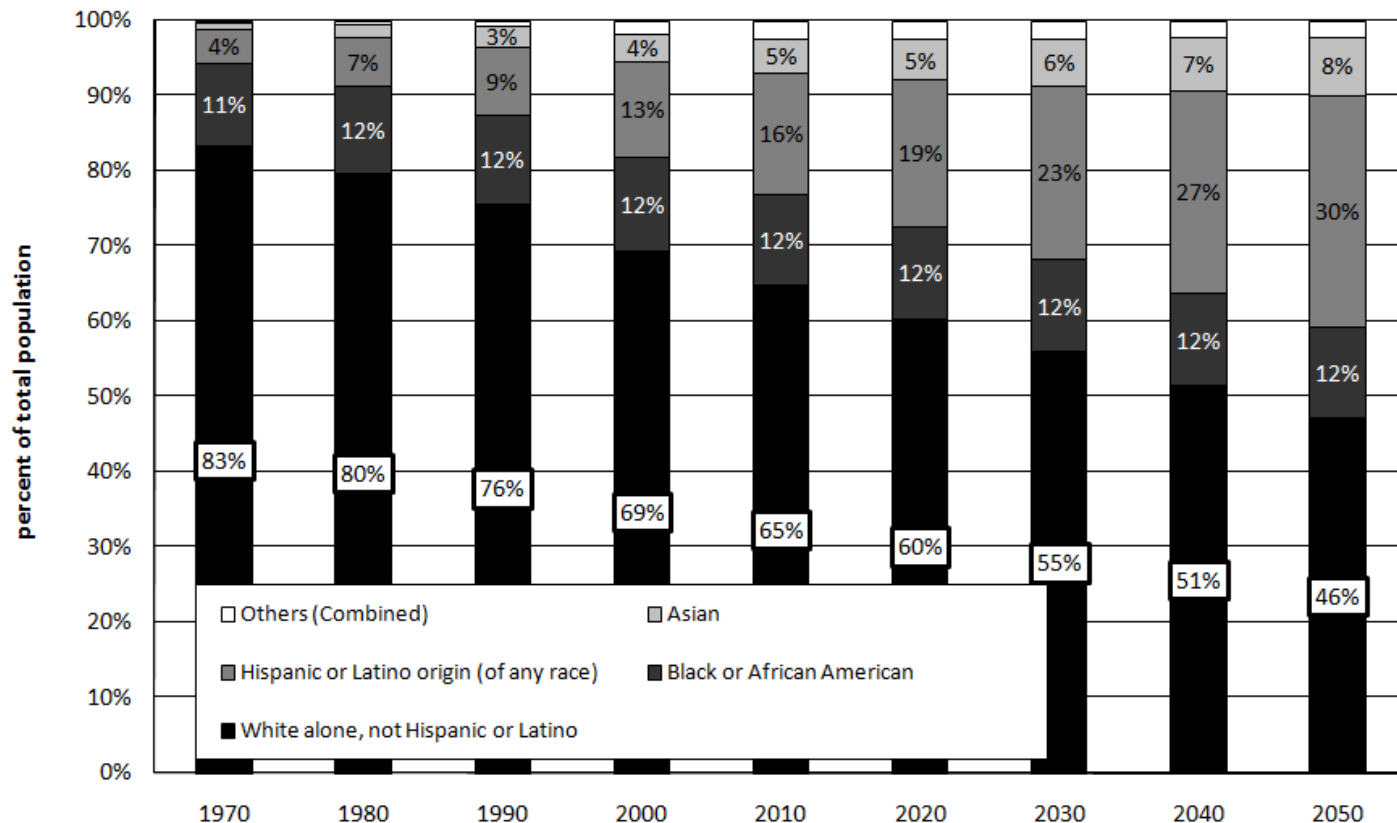
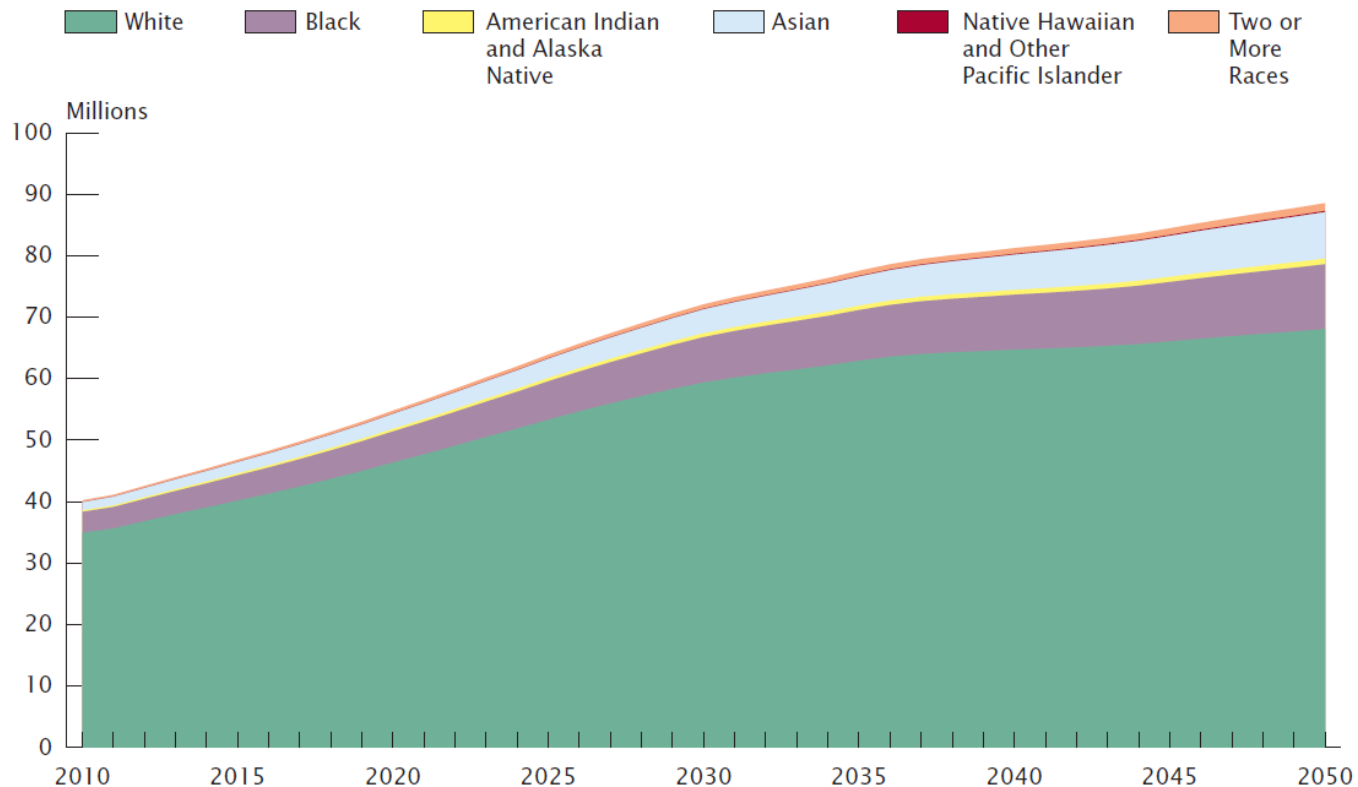


Figure courtesy of Manuel Pastor, USC, based on US Census data. From Pastor M, Blackwell AG, Kwoh S. *Uncommon Common Ground: Race and America's Future* (W.W. Norton, 2010).

# Demographics: Diversity

Figure 4.

## Projected Population Aged 65 and Over by Race for the United States: 2010 to 2050



Note: Unless otherwise specified, data refer to the population who reported a race alone. Populations for each race group include both Hispanics and non-Hispanics, as Hispanics may be of any race.

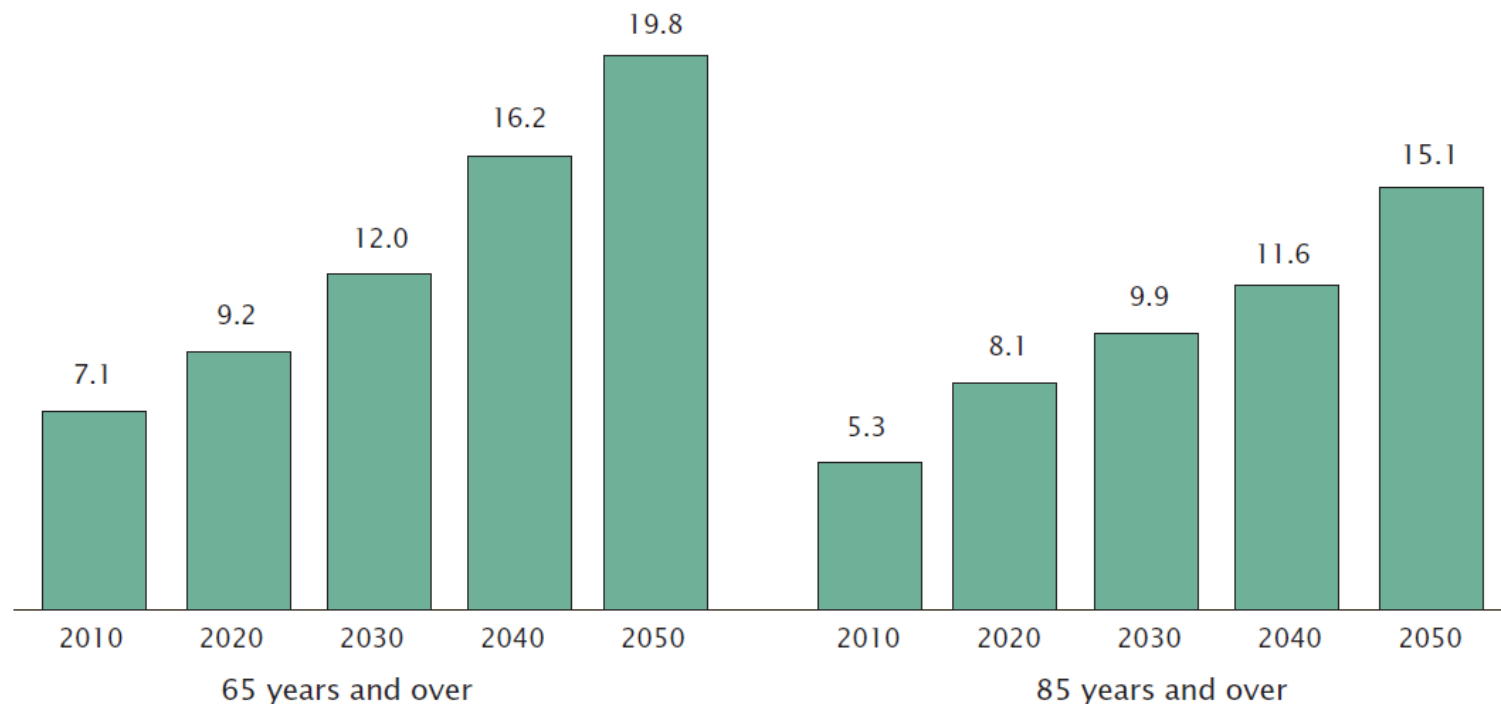
Source: U.S. Census Bureau, 2008.

Vincent, Grayson K. and Victoria A. Velkoff, 2010, *THE NEXT FOUR DECADES, The Older Population in the United States: 2010 to 2050*, Current Population Reports, P25-1138, U.S. Census Bureau, Washington, DC. Available: <http://www.census.gov/prod/2010pubs/p25-1138.pdf>.

# Demographics: Diversity

Figure 5.

**Percent Hispanic for the Older Population by Selected Age Groups for the United States: 2010 to 2050**



Source: U.S. Census Bureau, 2008.

Vincent, Grayson K. and Victoria A. Velkoff, 2010, *THE NEXT FOUR DECADES, The Older Population in the United States: 2010 to 2050*, Current Population Reports, P25-1138, U.S. Census Bureau, Washington, DC. Available: <http://www.census.gov/prod/2010pubs/p25-1138.pdf>.

# Vulnerabilities

Biological changes	Functional impact	Climate vulnerability
<b>Skin:</b> ↓ vasculature, ↓ sweating	↓ thermoregulation	Heat waves
<b>Cardiovascular:</b> ↓ vascular tone, ↓ adrenergic function	↓ thermoregulation ↓ tolerance of dehydration	Heat waves Waterborne diseases
<b>Immune:</b> ↓ immune function	↑ infectious risk	Vectorborne diseases Waterborne diseases
<b>Pulmonary:</b> ↓ flow and volume, ↓ oxygenation, ↓ cough efficacy	↓ pulmonary reserve ↑ airway & parenchymal disease	Ozone Allergens Wildfire smoke
<b>Muscular:</b> ↓ muscle mass	Frailty	Disaster response
<b>Nervous:</b> ↓ perfusion, ↑ plaques and tangles	Cognitive and memory loss	Disaster response
<b>Skeletal:</b> arthritic changes	↓ mobility	Disaster response
<b>Renal:</b> ↓ concentration, ↓ GFR	Impaired fluid balance	Heat waves

# Vulnerabilities

Circumstances	Functional impact	Climate vulnerability
<b>Multiple chronic diseases</b>	Disease-related vulnerabilities (obesity, diabetes, ↓ mobility, etc.)	Heat waves Disaster response
	Need for medications	Disaster response
<b>Social isolation</b>	↓ adaptation, support	Disaster response
<b>Depression</b>	Withdrawal, apathy	Disaster preparation, response
<b>Place (and stuff) attachment</b>	Reluctance to relocate	Need for relocation
<b>Limited incomes</b>	Reluctance regarding voluntary adaptive measures	Disaster preparedness
	Inability to pay for higher fuel, other costs	Deprivation



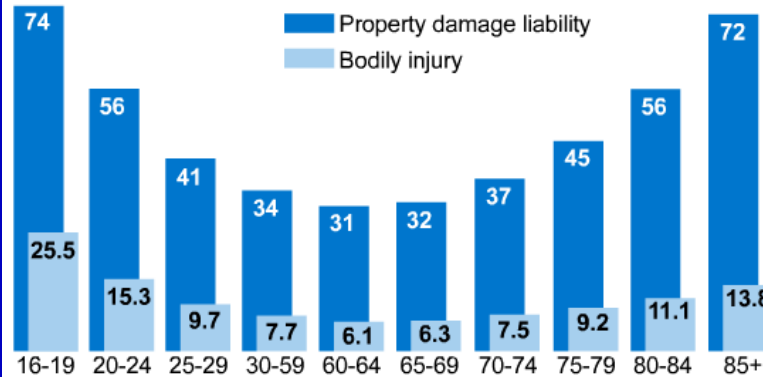
# Co-Benefits: Transportation



## As nation ages, elderly drivers present greater risks on the road

### Claims per 1,000 insured vehicles

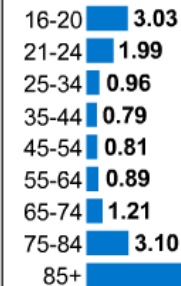
By age, 1999-2001



Sources: Carnegie Mellon University; AAA Foundation for Traffic Safety; U.S. Census Bureau; Insurance Institute for Highway Safety

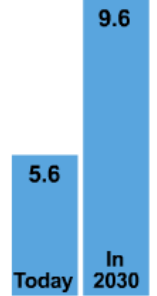
### Driver fatalities, 1999-2004

(By age, per 100 million miles driven)



### Americans 85 and older

In millions



▶ [Click for more information](#)

By Frank Pompa, USA TODAY

Davis R, DeBarros A. Older, dangerous drivers a growing problem. *USA Today*, May 2 2007

CDC, NCIPC. Older adult drivers. 2011. [http://www.cdc.gov/Motorvehicle/safety/Older\\_Adult\\_Drivers/index.html](http://www.cdc.gov/Motorvehicle/safety/Older_Adult_Drivers/index.html)

# Co-benefits: Transportation

Pedestrian and bicycle infrastructure, and transit systems, yield:

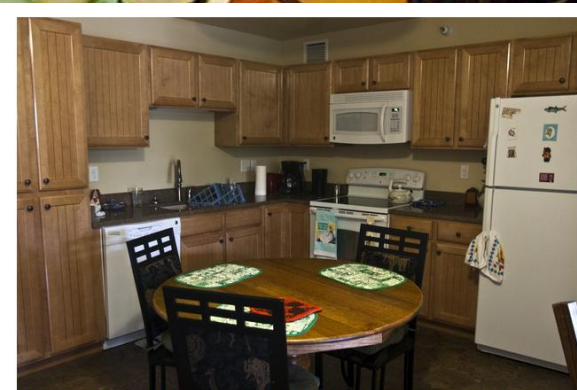
- Improved mobility
- Improved safety
- Physical activity
- Reduced carbon emissions



# Co-Benefits: Housing

Green housing for the elderly yields:

- Better conditions  
e.g. daylighting, IAQ
- Lower costs
- Reduced carbon footprint



(Chris Detrick | The Salt Lake Tribune) An apartment at the Plymouth View Senior Housing features maple cabinets and stone countertops.

## ‘Green’ housing is a hit with Taylorsville senior citizens

**Plymouth View »**  
Taylorsville  
donated land for  
the complex near  
rec center and  
park.

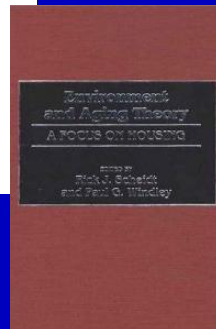
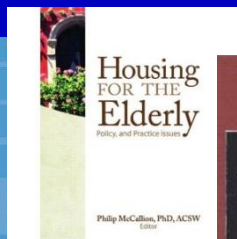
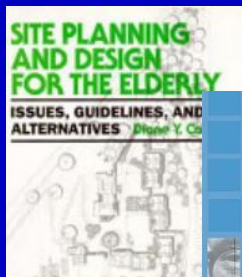
BY PAMELA MANSON  
The Salt Lake Tribune

[Tweet](#) [+1](#) [Like](#)

First published Jun 09 2011 05:36PM  
Updated Jun 22, 2011 02:12AM

Taylorsville • A new apartment complex is offering affordable housing for low-income seniors while going easy on the environment.

Plymouth View Senior Housing is the first “green” structure in its class in the 10-state Western region managed by the Department of Housing and





# Co-benefits: Nature contact

Green neighborhoods and elder survival:

- 3144 Tokyo elders (born 1903, 1908, 1913, 1918) followed 1992 - 1997
- 897 deaths by 1997
- $\approx 15\%$   $\downarrow$  mortality with “parks and tree-lined streets near the residence” (with dose-response relationship)

Age at baseline	(n)	Five year survival percentage	$\chi^2$ test
All	(3001)	71.1	
Space for taking a stroll near the residence			
Enough space available	(1425)	73.8	**
Some space available, not enough	(1314)	70.1	
Very little space available	(249)	67.9	
None	(79)	55.7	
Parks and tree lined streets near the residence			
Plenty	(915)	74.2	*
Some	(1328)	70.0	
Little	(583)	70.8	
Very little	(231)	66.2	
Noise from automobiles and factories near the residence			
Have no trouble	(882)	73.7	NS
Seldom have troubles	(1127)	70.4	
Sometimes have troubles	(780)	69.6	
Usually have troubles	(247)	71.3	
Safety against crimes in the community	(3001)	71.1	



Takano T, Nakamura K, Watanabe M. Urban residential environments and senior citizens' longevity in megacity areas: The importance of walkable green spaces. *J Epidemiol Comm Health* 2002;56(12):913-18

# Co-benefits: Nature contact

Form of contact	Benefit	Reference
<b>Green common spaces near home</b>	<b>Improved social ties and sense of community</b>	Kweon BW, Sullivan W, Wiley A. Green common spaces and the social integration of inner-city older adults. <i>Environ Behav</i> 1998;30:832-58.
<b>Green landscaping near home</b>	<b>Improved self-reported well-being</b>	Stoneham J, Jones R. Residential landscapes: Their contribution to the quality of older people's lives. <i>Activities, Adaptation &amp; Aging</i> 1997;22(1-2):17-26.
<b>Views of nature from apartment</b>	<b>Higher self-reported satisfaction</b>	Talbot J, Kaplan R. Benefits of nearby nature for elderly apartment residents. <i>Int J Aging Human Dev</i> 1991;33:119-30.
<b>Activities in an outdoor garden</b>	<b>No change in mood, anxiety; lower cortisol levels</b>	Rodiek S. Influence of an outdoor garden on mood and stress in older persons. <i>J Ther Hortic.</i> 2002;13:13-21



# Co-benefits: Nature contact

Accessible trees, greenspace and parkland yield:

- Improved health
- Venues for physical activity
- Improved air quality
- Heat wave blunting
- Stormwater management
- Carbon sinks





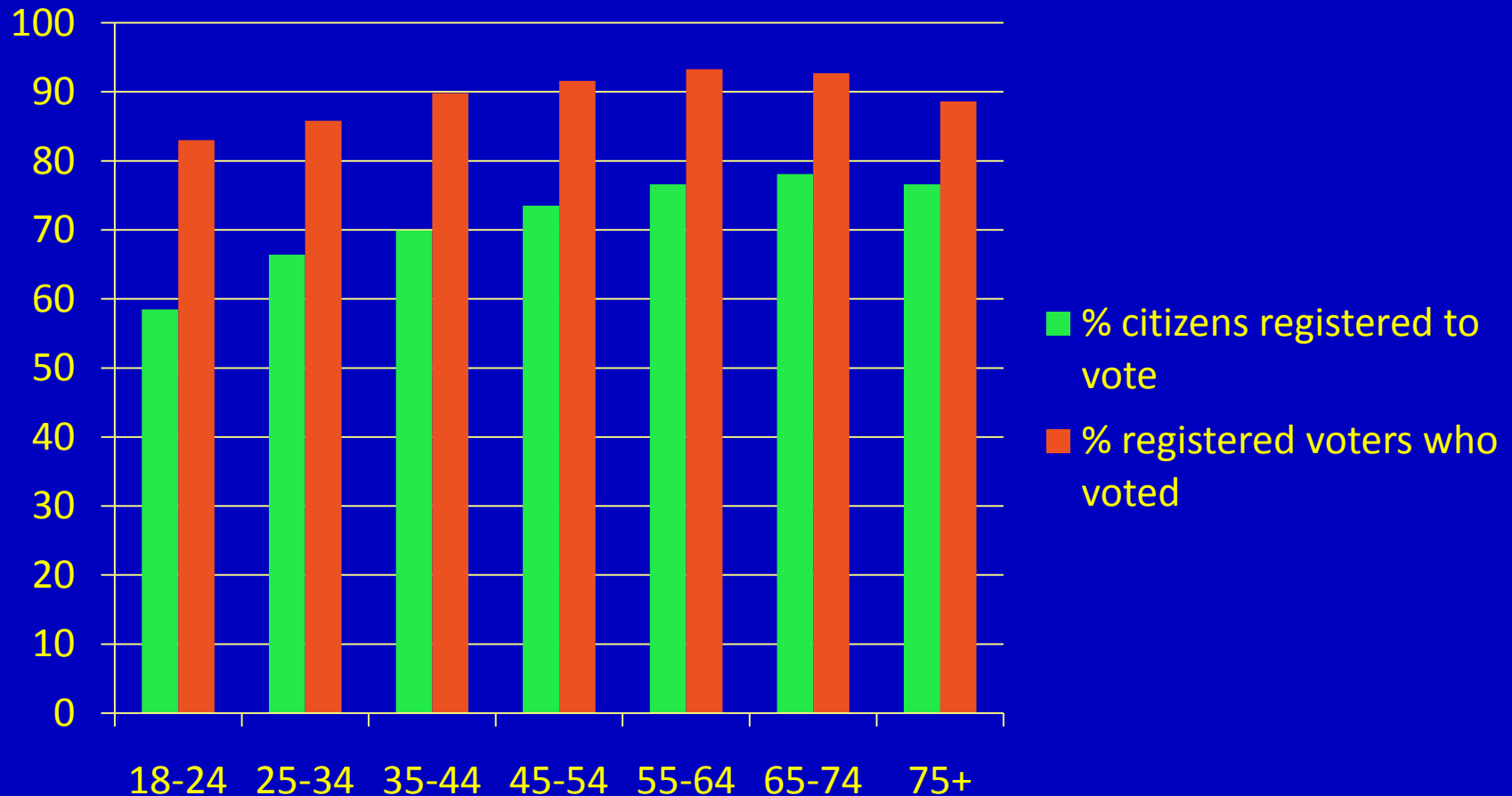
# Older Americans: A Climate Opportunity?

Dr. McBride...we  
**DEMAND** our flu shots!



# Old people vote

## Voter registration and voting by age, 2008



Source: File T, Crissey S. Voting and Registration in the Election of November 2008. Population Characteristics. U.S. Census Current Population Reports P20-562. May, 2010.



**Table 1 |** Amount of prior thought about global warming

	<i>National average</i>	<i>Ages 18 - 34 (29%)</i>	<i>Ages 35 - 59 (48%)</i>	<i>Ages 60+ (23%)</i>
How much had you thought about global warming before today?				
	%	%	%	%
<i>A lot</i>	15	10	16	17
<i>Some</i>	31	28	35	27
<i>A little</i>	36	39	33	40
<i>Not at all</i>	18	22	16	17
<i>n=</i>	<b>978</b>	<b>277</b>	<b>471</b>	<b>230</b>

Chi-square  $p < .05$

**Table 2 |** Personal importance of global warming

	<i>National average</i>	<i>Ages 18 - 34 (29%)</i>	<i>Ages 35 - 59 (48%)</i>	<i>Ages 60+ (23%)</i>
How important is the issue of global warming to you personally?				
	%	%	%	%
<i>Extremely important</i>	5	2	6	7
<i>Very important</i>	14	15	14	15
<i>Somewhat important</i>	37	39	39	32
<i>Not too important</i>	23	25	21	27
<i>Not at all important</i>	20	19	20	18
<i>n=</i>	<b>978</b>	<b>277</b>	<b>471</b>	<b>230</b>

Chi-square *n.s.*

**Table 3 |** Worry about global warming

	<i>National average</i>	<i>Ages 18 - 34 (29%)</i>	<i>Ages 35 - 59 (48%)</i>	<i>Ages 60+ (23%)</i>
How worried are you about global warming?				
	%	%	%	%
<i>Very worried</i>	12	9	12	14
<i>Somewhat worried</i>	38	37	41	34
<i>Not very worried</i>	27	32	26	25
<i>Not at all worried</i>	23	22	21	27
<i>n=</i>	<b>980</b>	<b>279</b>	<b>471</b>	<b>230</b>

Chi-square *n.s.*

**Table 6 | Belief in Global Warming**

	<i>National average</i>	<i>Ages 18 - 34 (29%)</i>	<i>Ages 35 - 59 (48%)</i>	<i>Ages 60 + (23%)</i>
Do you think that global warming is happening?				
	%	%	%	%
<i>Yes</i>	57	57	58	57
<i>Don't know</i>	23	23	21	26
<i>No</i>	20	20	22	17
<i>n=</i>	<b>992</b>	<b>285</b>	<b>476</b>	<b>231</b>

Chi-square *n.s.*

**Table 7 |** Beliefs about the scientific consensus on global warming

	National average	Ages 18 - 34 (29%)	Ages 35 - 59 (48%)	Ages 60 + (23%)
Which comes closer to your views?				
	%	%	%	%
<i>Most scientists think global warming is happening</i>	34	38	33	29
<i>There is a lot of disagreement</i>	40	40	39	42
<i>Most scientists think global warming is not happening</i>	5	2	7	4
<i>Don't know enough to say</i>	22	20	21	24
<i>n=</i>	<b>982</b>	<b>281</b>	<b>472</b>	<b>229</b>

Chi-square *n.s.*

**Table 8|** Beliefs about the causes of global warming

	<i>National average</i>	<i>Ages 18 - 34 (29%)</i>	<i>Ages 35 - 59 (48%)</i>	<i>Ages 60+ (23%)</i>
Assuming that global warming is happening, do you think it is...				
	%	%	%	%
<i>Caused mostly by human activities</i>	47	52	46	45
<i>Caused mostly by changes in the environment</i>	35	27	37	43
<i>Neither because global warming isn't happening</i>	9	12	9	5
<i>Caused by both human activities and natural changes (VOL)</i>	6	7	7	3
<i>Other</i>	1	1	1	3
<i>Don't know (VOL)</i>	1	1	1	1
<i>n=</i>	<b>979</b>	<b>279</b>	<b>468</b>	<b>232</b>

Chi-square  $p < .01$

**Table 5 |** Social norms about global warming

	<i>National average</i>	<i>Ages 18 - 34 (29%)</i>	<i>Ages 35 - 59 (48%)</i>	<i>Ages 60+ (23%)</i>
Most of my friends are trying to act in ways that reduce global warming.				
	%	%	%	%
<i>Strongly agree</i>	5	5	6	3
<i>Somewhat agree</i>	43	34	47	47
<i>Somewhat disagree</i>	37	46	32	39
<i>Strongly disagree</i>	14	15	15	11
<i>n=</i>	<b>934</b>	<b>260</b>	<b>463</b>	<b>211</b>

Chi-square  $p < .01$

From what you've read and heard, is there solid evidence that the average temperature on earth has been getting warmer over the past few decades, or not?

IF YES: Do you believe that the earth is getting warmer mostly because of human activity, such as burning fossil fuels, or mostly because of natural patterns in the earth's environment?

Age	Earth is warming	Human activity	Natural patterns	Earth is not warming
18-29	64	47	14	28
30-49	55	34	15	35
50-64	59	35	18	35
65+	50	25	16	35

Pew Research Center for the People and the Press. Fewer Americans See Solid Evidence of Global Warming. October, 2009. Available: <http://people-press.org/2009/10/22/fewer-americans-see-solid-evidence-of-global-warming/>



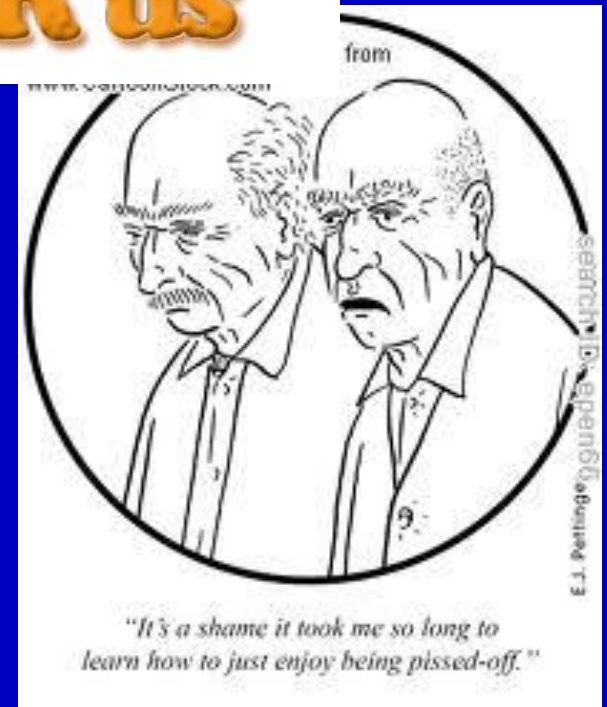
In your view, is global warming a very serious problem, somewhat serious, not too serious, or not a problem?

Age	Very serious	Somewhat serious	Not too serious	Not a problem
18-29	46	32	11	8
30-49	34	32	14	18
50-64	33	27	16	21
65+	25	30	20	20

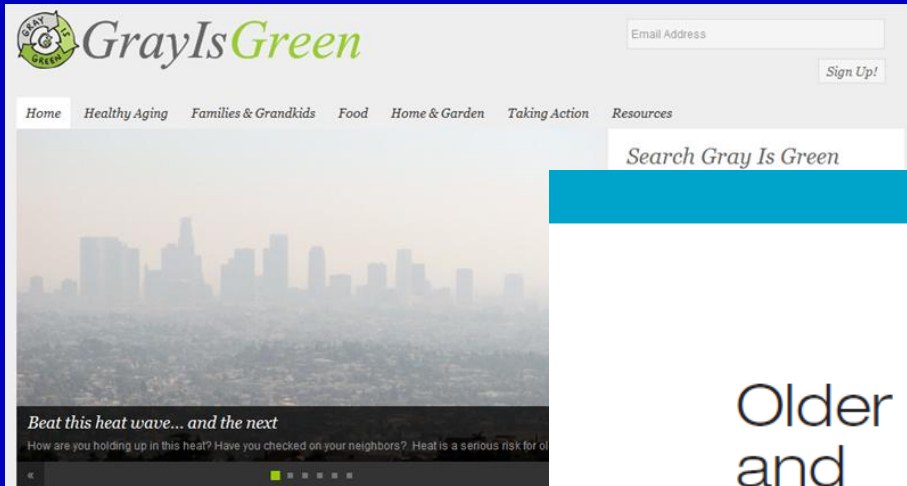
Pew Research Center for the People and the Press. Fewer Americans See Solid Evidence of Global Warming. October, 2009. Available: <http://people-press.org/2009/10/22/fewer-americans-see-solid-evidence-of-global-warming/>

What does aging mean for the way people think and behave?

# Are older people grumpy and selfish?



# Or are older people generous and altruistic?



Prepared by  
Zoë Gill,  
University of Adelaide

## The New York Times

### Elders Offer Help at Japan's Crippled Reactor



Kazuo Sakai, left, and Masaki Takahashi are among those who have volunteered in hopes of working at the crippled Fukushima nuclear power plant.

By KEN BELSON  
Published: June 27, 2011

TOKYO — By any measure, the thousands of people toiling to cool the crippled nuclear reactors in Fukushima are engaged in jobs that the Japanese consider kitanai, kitsui and kiken, or dirty, difficult and dangerous.

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# Does wisdom come with age?

"Any man who is under 30, and is not a liberal, has no heart; and any man who is over 30, and is not a conservative, has no brains."

-- Winston Churchill



## Aging and cognition:

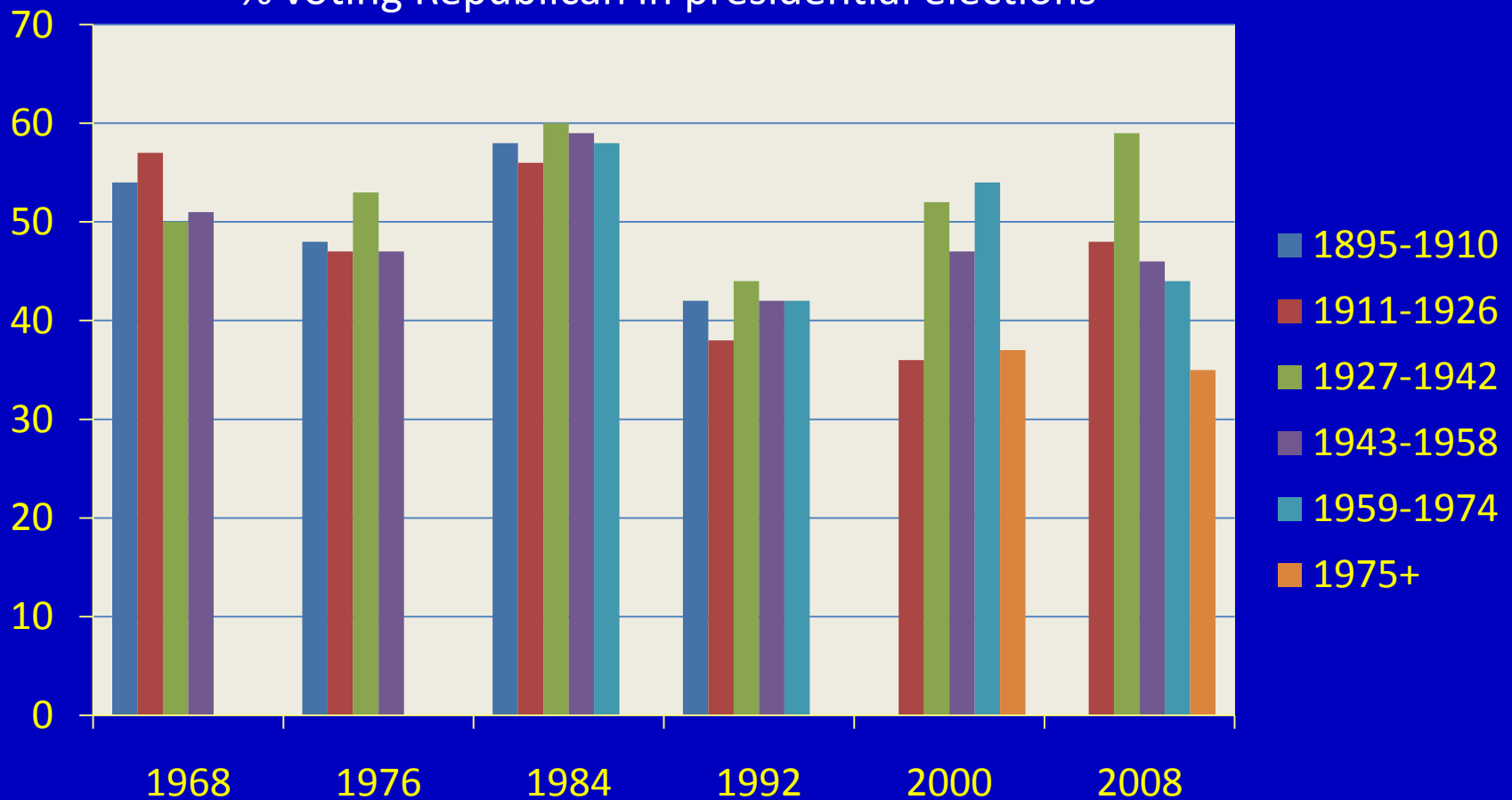
- Effect of aging is variable
- ↑ practical skills
- ↑ metacognitive abilities—integrating cognitive, interpersonal, emotional thinking
- ↓ processing speed, abstract reasoning, flexibility, memory

# Or do cohort values carry into old age?

Generation	Reach 65	History	Characteristics
<b>Silent generation</b> <ul style="list-style-type: none"> <li>• 1925-45</li> <li>• 55 million</li> </ul>	1990-2010	<ul style="list-style-type: none"> <li>• Great Depression</li> <li>• World War II</li> <li>• Rationing</li> <li>• FDR administration</li> </ul>	Dedication, sacrifice, hard work • Honor Law & order • Respect for authority • Conformity Delayed reward • Duty before pleasure • Patience
<b>Baby boomers</b> <ul style="list-style-type: none"> <li>• 1946-64</li> <li>• 76 million</li> </ul>	2011-2029	<ul style="list-style-type: none"> <li>• Cold War, Vietnam</li> <li>• Civil Rights</li> <li>• Space Race</li> <li>• Energy Crisis</li> <li>• Watergate</li> </ul>	Optimism • Involvement • Team orientation Work • Personal growth and gratification Health and wellness • Youth
<b>Gen X</b> <ul style="list-style-type: none"> <li>• ≈ 1965-81</li> <li>• 46 million</li> </ul>	2020-2036	<ul style="list-style-type: none"> <li>• Roe vs. Wade</li> <li>• Challenger disaster</li> <li>• Fall of Berlin Wall</li> <li>• Persian Gulf War</li> <li>• AIDS</li> </ul>	Diversity • Thinking globally • Balance Techno-literacy • Fun • Informality Self-reliance • Pragmatism
<b>Millenials (Gen Y)</b> <ul style="list-style-type: none"> <li>• ≈ 1982-2001</li> <li>• 80 million</li> </ul>	2037-2066	<ul style="list-style-type: none"> <li>• 9/11</li> <li>• Oklahoma bombings</li> <li>• Internet</li> <li>• Iraq and Afghanistan</li> </ul>	Optimism • Civic duty • Confidence Achievement • Sociability • Morality Street smarts • Diversity
<b>New Silent Generation</b> <ul style="list-style-type: none"> <li>• 2002-present</li> </ul>	2067-		

# Or both?

**Political preference by birth cohort**  
% voting Republican in presidential elections





# Dining Hall New College, Oxford

Story from: Stewart Brand. *How Buildings Learn: What Happens after They're Built*. Penguin, 1995, pp 130-31







“A society grows great when old men  
plant trees in whose shade they know  
they shall never sit.”

Greek proverb

# Legacy

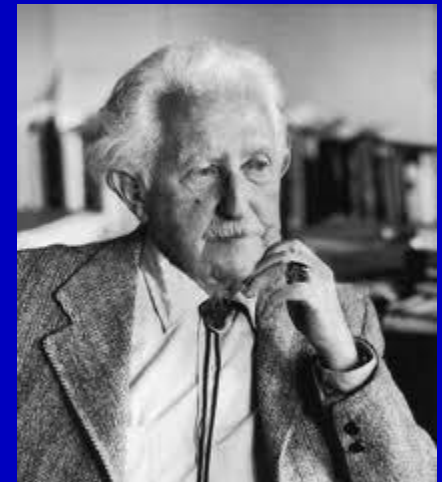
“Few of us are comfortable with the idea that we live, we die, and that is it. We want to believe that there is a purpose in life and that we will make a mark of some kind, perhaps only in the memories of our descendants, but a mark nonetheless. We were here; we thought; we loved; we created. This is the fertile ground from which the desire for legacy sprouts.”

Hunter EG, Rowles GD. Leaving a legacy: Toward a typology. *J Aging Studies* 2005;19(3):327-47.

# Generativity

Erik Erikson's 8 stages of development

- 7<sup>th</sup> stage (middle adulthood):  
“generativity vs. self absorption or stagnation”
- Focus on creative and meaningful work and on family issues
- **Generativity:** Building stability, perpetuating culture, transmitting values through the family

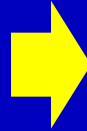


Erik Erikson  
1902-94

# From generativity to legacy

## Dimensions of generativity:

- **Biological** (reproduction)
- **Parental** (nurturing)
- **Technical** (teaching)
- **Cultural** (storytelling, transmitting meaning and values)



## Forms of legacy:

- **Biological** (genes, risk factors, and even bodies)
- **Material** (heirlooms)
- **Values** (social, personal, cultural)

Hunter EG, Rowles GD. Leaving a legacy: Toward a typology. *J Aging Studies* 2005;19(3):327-47.

Kotre J. *Outliving the Self: Generativity and the Interpretation of Lives*. Johns Hopkins, 1984.

## A modern view of legacy?

- Climate mitigation and adaptation
- Sustainability

# How to nurture legacy thinking?

- Appeal to self interest?
- Appeal to generativity and altruism?
- Appeal to religious faith?
- Focus on next generation, not distant generations?
- Encourage eco-involvement by elders?

# Elements of a research agenda

- Vulnerabilities of the elderly to climate change
- Ways of protecting the elderly from climate change (adaptation)
- Identifying and quantifying co-benefits of adaptation and mitigation
- Understanding the psychology and neurobiology of wisdom
- Understanding knowledge, attitudes, and behavior of the elderly regarding climate change, and how to motivate constructive engagement

# Elements of a research agenda

- Understanding the consuming patterns of older Americans
- Communication research
  - Understanding how older Americans get information and form opinions
  - Testing ways to utilize older Americans as climate communicators
- Forecasting shifts in all these factors over coming decades and generations

# Implementing a research agenda

- Potential partners for EPA
  - National Institute on Aging
  - FEMA
  - NGOs (AARP, Gerontological Society of America)
- Academic partnerships
  - Universities with environmental sciences, public health, and Centers on Aging
- Capacity-building
  - Training of geriatric professionals on climate
  - Training of climate aging issues



